

Application No. 10/508,925
Attorney Docket No. 2002B038A

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (original) In the hydroformylation of olefins by the Cobalt Flash Process, wherein an olefinic material is contacted with synthesis gas in the presence of a cobalt hydroformylation catalyst to produce an aldehyde product containing one more carbon atom than the olefinic material, the improvement comprising using acetic acid as the process acid and ~~adding at least one additional process step to said Cobalt Flash Process selected from: (1) separating an aqueous acetic acid distillate from an evaporator, used after a demetalling stage, into a concentrated acetic acid stream and an acetic acid-depleted water stream, and using the acetic acid-depleted water stream to wash an organic phase comprising crude aldehyde product from the demetalling reactor; and (2) adding an organic alcohol to a preformer reactor whereby formic acid present in said preformer are converted to the corresponding formate ester of the organic alcohol.~~
2. (currently amended) The process according to Claim 1, ~~both additional process steps are used~~ the improvement further comprising adding an organic alcohol to a preformer reactor whereby formic acid present in said preformer are converted to the corresponding formate ester of the organic alcohol.
3. (original) The process according to Claim 2, wherein said separating is by reverse osmosis using a polymeric membrane comprising an aromatic polyamide.
4. (original) The process according to Claim 2, wherein said separating is by pervaporation using a ceramic membrane.

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5. (original) The process according to Claim 2, wherein the organic alcohol added to said preformer is provided by recycling a portion of the aldehyde washed with said acetic acid-depleted water stream.
6. (original) The process according to Claim 2, further comprising a step of hydrogenating said aldehyde to an alcohol and wherein a portion of said alcohol is recycled to said preformer.
7. (original) The process according to Claim 1, wherein the olefinic material that is hydroformylated is made by oligomerizing a lower olefinic material over a siliceous acidic monodimensional zeolite selected from ZSM-22 and ZSM-23 having acidic pore activity and wherein the zeolite surface is rendered substantially inactive for acidic reactions with 2,4,6-collidine.
8. (original) The process according to Claim 7, wherein said lower olefinic material is provided by n-butene and propylene in the ratio of about 1:0.01 to 1:0.49.
9. (currently amended) The process according to Claim 1, wherein the olefinic material that is hydroformylated is made by a process selected from ~~the Octol® process, the Dimersol® process,~~ an oligomerization process using a solid phosphoric acid catalyst, and an oligomerization process using ZSM-57.
10. (currently amended) A process for making an aldehyde by hydroformylation comprising:
 - (a) contacting synthesis gas with an olefinic organic compound in the presence of a cobalt carbonylation catalyst in one or more oxo reactors to produce a crude product comprising an aldehyde;
 - (b) passing a crude product produced in said one or more oxo reactors to one or more stripper reactors where the crude product is contacted with water, acid, and

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synthesis gas, wherein cobalt carbonyl is taken off overhead of said stripper reactors and crude aldehyde is taken off at the bottom portion of said stripper reactors;

(c) passing the portion taken overhead, comprising cobalt carbonyl, from the one or more stripper reactors back to the one or more oxo reactors and passing the bottom portion, comprising crude hydroformylation product and cobalt values, from the one or more stripper reactors to one or more demetalling reactors, wherein the cobalt values are converted into cobalt acetate;

(d) separating the crude hydroformylation into an aqueous phase, comprising cobalt acetate, and an organic phase, comprising the crude hydroformylation product;

(e) recovering the aldehyde phase and passing the aqueous phase to an evaporator;

(f) concentrating the aqueous phase comprising cobalt acetate in said evaporator by distilling off a stream comprising water and acetic acid and taking a bottom portion comprising cobalt acetate from said evaporator comprising concentrated cobalt acetate;

(g) passing said concentrated cobalt acetate to a preforming stage wherein said portion comprising concentrated cobalt acetate values is contacted with synthesis gas in the presence of an organic phase to form cobalt carbonyl;

(h) passing said cobalt carbonyl from the preformer to said one or more stripper reactors;

~~wherein said process further comprises at least one additional step selected from:~~

(f) separating said stream comprising water and acetic acid from said evaporator into an acetic acid-rich stream and acetic acid-depleted water stream and using the acetic acid-depleted water stream to wash said aldehyde phase recovered in step (e) in a wash tower, whereby an acetic acid-depleted aldehyde phase is obtained; and

~~(j) adding an organic alcohol to said preforming stage in an amount and for a time sufficient to convert a substantial portion of formic acid impurities into formate esters of said organic alcohol while avoiding a substantial portion of acetic acid conversion to acetate esters of said organic alcohol.~~

11. (original) The process according to Claim 10, ~~wherein said additional steps (i) and (ii) are both used in said process~~ further characterized by adding an organic alcohol to said

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preforming stage in an amount and for a time sufficient to convert a substantial portion of formic acid impurities into formate esters of said organic alcohol while avoiding a substantial portion of acetic acid conversion to acetate esters of said organic alcohol.

12. (currently amended) The process according to Claim 11, wherein said separating of said stream comprising water and acetic acid ~~in step (i)~~ is by reverse osmosis using a polymeric membrane comprising an aromatic polyamide.

13. (currently amended) The process according to Claim 11, wherein said separating of said stream comprising water and acetic acid ~~in step (i)~~ is by pervaporation using a ceramic membrane.

14. (original) The process according to Claim 11, wherein the organic alcohol added to said preformer is provided by recycling a portion of the aldehyde washed with said acetic acid-depleted water stream.

15. (original) The process according to Claim 11, further comprising a step of hydrogenating said aldehyde to an alcohol and wherein a portion of said alcohol is recycled to said preformer.

16. (original) The process according to Claim 11, wherein the olefinic material that is hydroformylated is made by oligomerizing a lower olefinic material over a siliceous acidic monodimensional zeolite selected from ZSM-22 and ZSM-23 having acidic pore activity and wherein the zeolite surface is rendered substantially inactive for acidic reactions with 2,4,6-collidine.

17. (original) The process according to Claim 16, wherein said lower olefinic material is provided by n-butene and propylene in the ratio of about 1:0.01 to 1:0.49.

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18. (original) The process according to Claim 11, wherein the olefinic material that is hydroformylated is made by a process selected from ~~the Octel® process, the Dimersol® process,~~ an oligomerization process using a solid phosphoric acid catalyst, and an oligomerization process using ZSM-57.

19. (previously presented) The process according to Claim 1, wherein the olefinic material that is hydroformylated is made by an oligomerization process using ZSM-57.

20. (previously presented) The process according to Claim 11, wherein the olefinic material that is hydroformylated is made by an oligomerization process using ZSM-57.